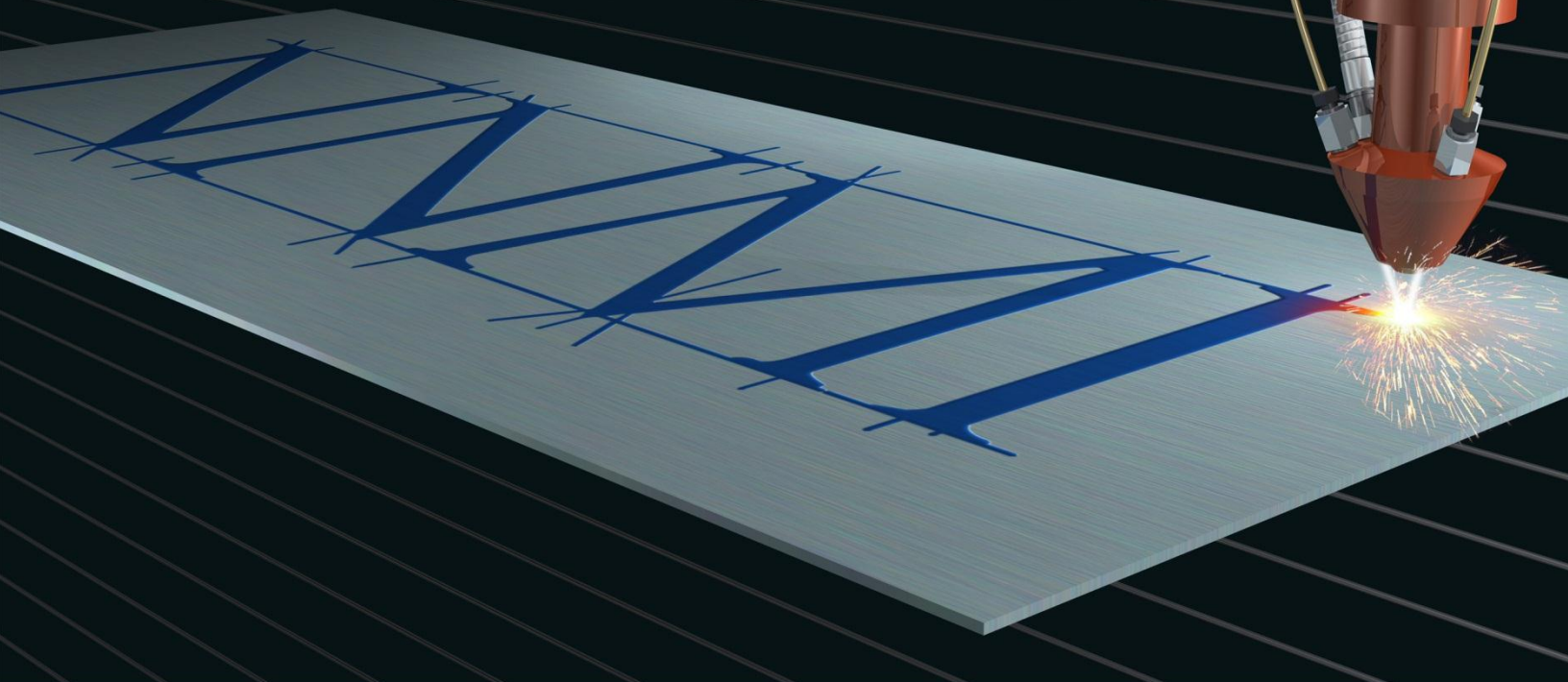


BLUEPRINT FOR ACTION



Workshop on the Design of the
National Network for Manufacturing Innovation
Summary Report

Huntsville, Alabama • 16 January 2013



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Acknowledgment

The Advanced Manufacturing National Program Office (NPO) would like to thank everyone who participated in *Blueprint for Action I: Workshop on the Design of the National Network for Manufacturing Innovation*, held on January 16, 2013, at the U.S. Space and Rocket Center, Davidson Center for Space Exploration. In addition, the Advanced Manufacturing NPO would like to thank the Department of Defense and NASA for hosting the workshop and preparing this report. The presentations and discussion that took place during the workshop provided the foundation for this report.

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This report was prepared for the AMNPO by ANSER.

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Preface

The United States has long relied on a strong industrial base to lead world markets and drive a thriving economy. Manufacturing firms are important drivers for innovation and account for 70 percent of private-sector research and development (R&D) funding and over 90 percent of patents issued.¹ This innovation leads to new products that improve the way of life for many and creates high-quality jobs and tax revenue in the process. In 2010, manufacturers produced about \$1.7 trillion of goods—about 12% of U.S. gross domestic product—and produced 86% of all U.S. goods exports.² Furthermore, the benefits of manufacturing are not confined to the industrial sector. For every \$1 of manufacturing value added, an additional \$1.40 is added in other sectors.³

According to the Council on Competitiveness, “U.S. manufacturing is more important now than ever.”⁴ However, the state of the U.S. manufacturing sector has deteriorated significantly over the past decade. Thirty-three percent of all manufacturing jobs were lost during the 2000s—a job rate loss that exceeds that of the Great Depression.⁵ Moreover, real value added dropped 11% between 2000 and 2010.⁶ Manufacturing output decreased across the economy, with only a few sectors showing positive growth in output.

On March 9, 2012, President Obama unveiled a plan that calls for establishing a National Network for Manufacturing Innovation (NNMI) to strengthen the innovation performance, competitiveness, and job-creating power of U.S. manufacturing. In his budget for fiscal year 2013, the President proposed the creation of a network of up to 15 regional Institutes for Manufacturing Innovation (IMIs). Funded by a proposed one-time, \$1 billion investment, this

¹ Gene Sperling. Remarks at the Conference on the Renaissance of American Manufacturing. March 27, 2012. www.whitehouse.gov/sites/default/files/administration-official/sperling_-_renaissance_of_american_manufacturing_-_03_27_12.pdf.

² Census Bureau and Bureau of Economic Analysis, U.S. International Trade in Goods and Services.

³ The Manufacturing Institute. *The Facts About Modern Manufacturing*, 8th Edition. 2009. www.nist.gov/mep/upload/FINAL_NAM_REPORT_PAGES.pdf.

⁴ Council on Competitiveness. www.compete.org/.

⁵ Robert D. Atkinson, Luke A. Stewart, Scott M. Andes, and Stephen J. Ezell, *Worse Than the Great Depression: What Experts Are Missing About American Manufacturing Decline* (Washington, DC: Information Technology & Innovation Foundation, March 2012), citing the Bureau of Labor Statistics and the Census Bureau, Current Employment Statistics. www2.itif.org/2012-american-manufacturing-decline.pdf.

⁶ Robert D. Atkinson, et al., citing the Bureau of Economic Analysis, Industry Economic Accounts. www2.itif.org/2012-american-manufacturing-decline.pdf.

Network—the NNMI—responds to a crucial competitiveness challenge and threat to future prosperity.

In recognizing the timeliness of this challenge, the President announced pilot in additive manufacturing to help develop the NNMI using limited but available fiscal year 2012 funding. Announced on August 16, 2012, the National Additive Manufacturing Innovation Institute focuses on accelerating additive manufacturing innovation by bridging the gap between basic research and mature development work. It will help advance a critical set of manufacturing technologies and inform the development of future IMIs.

At the same time as the additive manufacturing pilot Institute was being established, efforts continued at the national level to define the structure, technical focus, and governance of the full Network of Institutes through a series of four *Designing for Impact* workshops across the country, and through a Request for Information (RFI) that ended on October 25, 2012. That effort culminated with the publication of a report by the Administration’s National Science and Technology Council entitled *National Network for Manufacturing Innovation: A Preliminary Design*.⁷

This report documents the public discussions and outputs from the January 16, 2013 *Blueprint for Action* workshop held at the U.S. Space and Rocket Center, Davidson Center for Space Exploration, in Huntsville, Alabama. The workshop had as its goal to present the proposed design of the NNMI and its regional components, Institutes for Manufacturing Innovation (IMIs), for public discussion of the proposed design, and of this initiative announced by President Obama.

⁷ Visit: http://manufacturing.gov/news_011613.html

Executive Summary

In May 2012, the Advanced Manufacturing National Program Office (NPO) issued a formal Request for Information (RFI) on a new public-private partnership proposed by President Obama: the National Network for Manufacturing Innovation (NNMI).

Published in the *Federal Register* and posted on the Advanced Manufacturing NPO's Advanced Manufacturing website, the RFI sought ideas, recommendations, and other public input on the design, governance, and other aspects of the proposed Network. In addition to the RFI, the Advanced Manufacturing NPO solicited input through four regional *Designing for Impact* workshops. Geographical locations for the four workshops were chosen to lower the barriers to participation, maximize the amount and quality of stakeholder input, and ensure that regional industries without a strong national presence had an engagement opportunity.

Figure 1: Four *Designing for Impact* workshops

April 15, 2012: Troy, NY

July 9, 2012: Cleveland, OH

September 27, 2012: Irvine, CA

October 18, 2012: Boulder, CO



The reports from each of these workshops can be found on the manufacturing.gov website.

This report summarizes the *Blueprint for Action* workshop, which was a fifth workshop held by the Advanced Manufacturing NPO, having a different agenda and focus from the four previous workshops. This workshop was a “pivot” event, structured to present to stakeholders the proposed preliminary design of the NNMI and its regional components, the IMIs. That design was released to all participants in advance of the workshop with the publication of the Administration’s National Science and Technology Council’s (NSTC) report entitled *National Network for Manufacturing Innovation—A Preliminary Design*.⁸ Attendees had a chance to review the design concepts contained in the report and came prepared to provide feedback at the workshop. The workshop agenda included a review of the public comments received by the Advanced Manufacturing NPO in response to the RFI and the four *Designing for Impact* workshops, an update on the NNMI program proposed by the President, a review of the proposed NNMI design tenets, and discussion of anticipated next steps.

⁸ Visit: http://manufacturing.gov/news_011613.html

The *Blueprint for Action* workshop was held at the U.S. Space and Rocket Center, Davidson Center for Space Exploration, in Huntsville, Alabama, on January 16, 2013. The event attracted 303 participants representing a diverse and wide-ranging mix of sectors, including economic development, government (federal, state, and local), academia, and industry. The workshop was organized by the federal interagency Advanced Manufacturing NPO, in cooperation with stakeholders and local organizations and partner agencies that include the Department of Commerce and its National Institute of Standards and Technology (NIST), the Departments of Defense, Education, Energy, and Labor, the National Aeronautics and Space Administration (NASA), and the National Science Foundation.

Most of the workshop was devoted to interactive sessions, or café's, that functioned, in systems engineering parlance, as a "preliminary design review". These café's provided a forum to discuss the proposed key design elements of the NNMI as presented within the January 16th NSTC report.

The workshop began with the opening from Mr. John Vickers (Director of the National Center for Advanced Manufacturing, NASA) introducing the host for the event Ms. Adele Ratcliff (Director, Manufacturing Technology, Department of Defense). Welcoming remarks followed from Mr. Thomas M. "Tommy" Battle, Jr., Mayor of Huntsville, Alabama; Dr. Robert A. Altenkirch, President of the University of Alabama in Huntsville; Mr. Patrick Scheuermann, Director, NASA Marshall Space Flight Center; and Major General William Crosby, U.S. Army Program Executive Officer—Aviation and Missile Command. Mr. Brett Lambert (Deputy Assistant Secretary of Defense, Manufacturing and Industrial Base Policy) and Dr. Phillip Singerman (Associate Director for Innovation and Industrial Services, NIST) set the stage for the discussions throughout the day. The Advanced Manufacturing NPO's Director, Mr. Mike Molnar, then presented an overview of the proposed design characteristics. Following this, the preliminary NNMI design characteristics were outlined by four speakers in the following areas:

- Dr. Scott Smith (NIST) presented the major tenets of Technologies with Broad Impact
- Dr. LaNetra Tate (NASA) covered Institute Structure and Governance
- Ms. Adele Ratcliff (Defense Department) discussed Strategies for Sustainable Institute Operations
- Mr. Greg Henschel (Education Department) emphasized Education and Workforce Development

The remainder of the workshop focused on soliciting feedback from and providing additional information to individual participants through a series of interactive café sessions dedicated to the four design characteristics. The feedback received in these sessions is distilled in the body of this report. Thus the purpose of these cafés was:

- To conduct a design review and gain individual insights from academia, industry, nonprofit organizations, local and state agencies, and other stakeholders on the four areas of design as proposed in the Preliminary Design document; and
- Based upon the concepts presented within the NNMI Preliminary Design, discuss how participants might address or respond to various challenges relative to a hypothetical Institute.

The interactive café discussions were guided by eight representatives from the Departments of Commerce, Defense, Energy, and Education; and NASA; along with a team of facilitators. The primary role of the discussion leaders was to ensure that all the voiced ideas, concerns, and recommendations were heard and properly documented as they were intended by each stakeholder or participant, without consensus building, ranking, prioritization, or other bias. Discussions were structured around a series of leading topics, or challenges, as detailed in this report below. The sections below provide a summary of the transcripts generated at all of the café sessions held throughout the workshop and include additional input received in written form from individual participants. The comments do not necessarily represent the views of the Advanced Manufacturing NPO or its partner agencies.

Café topics for all sessions are listed below.

Café 1: Technologies with Broad Impact

1. How could a proposing team select a well-defined focus area that meets both industry and national needs? What metrics could be used to help justify the selected focus area(s) and scale of effort?
2. How would you design an Institute with a regional focus and position the Institute to create national/international technical preeminence? Is it possible to do this with an industry, technology, or process and product focused Institute agenda?

Café 2: Institute Structure and Governance

1. The NNMI preliminary design calls for an Institute to be led by an independent, not-for-profit organization. How then should an Institute leverage academic and regional resources, interface effectively with these and other key stakeholders, and manage intellectual property obligations?
2. How should participation by non-domestic organizations be managed to maximize impact to the United States? For example, how might an Institute manage participation by a multi-national organization? Should a non-domestic organization participate in or lead a project?

Café 3: Strategies for Sustainable Institute Operations

1. How can an Institute sustain its operations beyond the 5-7 year mark?

- a) How can an Institute unlock private investment? What strategies could be followed to attract partners, with particular attention to infrastructure and shared-use facilities, training and education, and other Institute “products”?
 - b) What might a sustainable Institute budget look like? How would an Institute’s diverse funding sources evolve with time?
2. What might be some go/no-go criteria for uninterrupted flow of NNMI funds to an Institute?

Café 4: Education and Workforce Development

1. How can an Institute exercise industry leadership with other key stakeholders in workforce training and development?
2. How should an Institute be responsive to a region’s workforce development and training priorities, and pursue initiatives that are responsive to the nation’s needs?

The discussions in the Café Sessions were spirited and marked by great enthusiasm for the NNMI program, and the preliminary design was very well received by all stakeholders, including industry, academia, local government and economic development organizations. Lessons from the pilot institute, the input from the previous workshops and the RFI were all incorporated into the preliminary design document, and discussed in depth throughout the Huntsville workshop. The strongest message from the workshop was that the preliminary design was confirmed, and the feedback was strongly positive.

Introduction and Background

Summary of the NNMI Effort

The state of the U.S. manufacturing sector has declined significantly over the past decade. Thirty-three percent of all manufacturing jobs were lost during the 2000s—a job rate loss that exceeds that of the Great Depression. As a result, manufacturing output has decreased across the economy with only a few sectors showing positive growth in output. A strong manufacturing sector is vital to the overall health of the American economy, yet over the past decade, the United States has lost nearly one in three of its manufacturing jobs. The trend toward offshore manufacturing directly impacts the nation's ability to compete when it comes to innovation, which the nation relies upon to generate high-quality jobs in addition to tax revenue.

To address this challenge, President Obama announced a proposal to create a National Network for Manufacturing Innovation comprising up to 15 Institutes for Manufacturing Innovation. The National Network for Manufacturing Innovation will bring together industry, universities and community colleges, federal agencies, and regional and state organizations to accelerate innovation by investing in industrially relevant manufacturing technologies with broad applications.

Within the NNMI model, each IMI will have its own distinct topic or technology focus, determined through a competitive proposal and review process managed by the Advanced Manufacturing National Program Office. This process will identify highest-value cross-cutting manufacturing challenges and opportunities, and will bring together all manufacturing stakeholders including (federal, state and local) government, industry, academia (research universities and community colleges), and other key organizations (industry consortia, economic development organizations, national laboratories, etc.). Institutes will act to anchor a region's innovation infrastructure, will conduct research and demonstration projects, will offer facilities comprising an "industrial commons" to accelerate the formation and growth of small and medium-sized enterprises, and will integrate education and workforce training functions into their operations. IMIs will engage with many types of corporations, with particular emphasis on engaging small and medium-sized manufacturing enterprises. They will provide shared-use facilities with the goal of scaling up laboratory demonstrations and maturing technologies for manufacture. American companies and international corporations with significant holdings in the United States are envisioned as participants in these Institutes.

Institutes will be a partnership among government, industry, and academia, supported with cost-share funding from nonfederal sources. It is expected that Institutes will typically receive \$70 million to \$120 million in total federal funds, depending upon the magnitude of the opportunity, maturity of the technology, and scope of the focus area, over a five- to seven-year timeframe. When combined with substantive nonfederal co-investment (for example 1:1), it is envisioned the total capitalization of an Institute over this period will be \$140 million to \$240 million. Institutes will be expected to become sustainable within seven years of launch through income-generating activities including member fees, intellectual property (IP) licenses, contract research, competitive solicitation research, and fee-for-service activities. The proposed design is of a size and scale to provide long-term economic impact on both regional and national scales.

Preliminary Design of the National Network

The Administration's NSTC report, *National Network for Manufacturing Innovation—A Preliminary Design* is based upon engagement of stakeholders through the latter half of 2012, including four regional workshops and the RFI responses. The NNMI preliminary design document⁹ contains detailed descriptions for each critical issue involved in the design of the Network, including Network leadership, technology focus areas, governance, sustainability, and workforce development and education elements. The following paragraphs offer a summary of the preliminary design.

Because today's challenges associated with advanced manufacturing are multifaceted, each IMI will have its own distinct manufacturing focus which could fit in one of four categories: manufacturing processes, advanced materials, enabling technology, or industry sector. IMIs will be determined through a process of competitive proposals, which will define both the manufacturing focus and the regional structure. This process will identify the highest-value crosscutting manufacturing challenges and opportunities and proposals will bring together manufacturing stakeholders including government, industry, and academia. In their individual focus areas, Institutes will act to anchor a region's innovation infrastructure and will conduct research and demonstration projects.

IMIs will offer facilities comprising an "industrial commons" (the R&D, engineering, and manufacturing capabilities needed to turn inventions into competitive, manufacturable commercial products) to accelerate the formation and growth of small and medium-sized enterprises and will integrate education and workforce training functions into their operations. IMIs will engage with many types of corporations, with particular emphasis on engaging small and medium-sized enterprises. They will provide shared-use facilities with the goal of scaling up laboratory demonstrations and maturing technologies for manufacture. American companies and international corporations with significant holdings in the United States are envisioned as participants in these Institutes.

IMIs are to be led by independent, not-for-profit institutions that strongly leverage industry consortia, regional clusters, and other resources in science, technology, and economic development. Institutes are intended to link and leverage all available resources, including institutions funded through existing federal programs, so that they have national and global impact. Institutes will be established through a competitive solicitation and evaluation process managed by the interagency Advanced Manufacturing NPO. Current participating agencies include the Departments of Commerce (NIST), Defense, Education, and Energy; NASA; and the National Science Foundation.

In addition to organizational governance at the Institute level, IMIs will formally collaborate through a Network Leadership Council made up of representatives from the Institutes, federal agencies, and other entities as appropriate. The Leadership Council will oversee efforts to develop consistent and common approaches for matters such as IP, contracts, research and performance metrics, and facilitating the sharing of best practices. Each Institute will also participate in the Advanced Manufacturing NPO-hosted Manufacturing Portal, a web-based resource to help manufacturers locate relevant research, research partners, and pertinent information within the NNMI.

⁹ *National Network for Manufacturing Innovation: A Preliminary Design*. National Science and Technology Council, Advanced Manufacturing National Program Office. January 2013.

Workshop Topics and Organization

The Huntsville *Blueprint for Action* workshop attracted 303 participants representing a diverse and wide-ranging mix of organizations, including economic development, government (federal, state, and local), academia, and industry.

Mr. John Vickers (Director of the National Center for Advanced Manufacturing, NASA) welcomed the attendees and introduced the workshop host, Ms. Adele Ratcliff (Director, Manufacturing Technology, Department of Defense). Welcoming addresses were delivered by Mr. Thomas M. “Tommy” Battle, Mayor of Huntsville; Dr. Robert Altenkirch, President, the University of Alabama in Huntsville; Mr. Patrick Scheuermann, Center Director, NASA Marshall Space Flight Center; and Major General William Crosby, U.S. Army Program Executive Officer—Aviation and Missile Command.

Upon completion of the welcoming addresses, the focus shifted to addresses from key stakeholders that set the tone for the workshop. Mr. Brett Lambert (Deputy Assistant Secretary of Defense, Manufacturing and Industrial Base Policy) discussed the importance of the manufacturing base not only in regard to national security but the stability of our economy. Dr. Phillip Singerman (Associate Director for Innovation and Industrial Services, NIST) discussed the importance of private-public partnerships and how they will support technology clusters.

Mr. Mike Molnar (Director, Advanced Manufacturing NPO) presented the overview of the proposed NNMI design and selection process. He began his presentation with the status, vision, and scope of the program and then focused on how NNMI would address the “gap” between government and university investments and private-sector investments. He referred to this issue as the “missing Bell Labs” or the “missing middle.” The NNMI design process, key characteristics, investment plan, and selection criteria were provided as the central backdrop to more focused discussion of the afternoon café sessions.

He then introduced speakers who would outline the four NNMI design characteristic topics to be discussed in the cafés (copies of the presentations are available on the manufacturing.gov website):

- “Technologies with Broad Impact,” were discussed by Dr. Scott Smith, Advanced Manufacturing NPO
- “Institute Structure and Governance,” presented by Dr. LaNetra Tate, NASA
- “Strategies for Sustainable Institute Operations,” were outlined by Ms. Adele Ratcliff, Department of Defense
- “Education and Workforce Development,” was covered by Mr. Greg Henschel, Department of Education

At the conclusion of the presentations, Mr. Molnar chaired a short question-and-answer session for the four speakers. Prior to dismissal for lunch, Mr. Molnar outlined the design and purpose of the afternoon café sessions and provided instruction for the attendees. After lunch, a plenary panel entitled “Perspectives in Building Technology Clusters” was chaired by Ms. Rebecca Taylor, Senior Vice President, at the National Center for Manufacturing Sciences. The panel was comprised of:

- Mr. Ron Davis, Executive Director, Alabama Entrepreneurship Institute
- Dr. Jennifer Fielding, Program Manager, National Additive Manufacturing Innovation Institute, Air Force Research Laboratory

- Mr. Ralph Resnick, President and Executive Director, National Center for Defense Manufacturing and Machining
- Ms. Bethany Clem Shockney, Dean, Business/CIS, Technologies & Workforce Development, Calhoun Community College

The remainder of the workshop focused on soliciting feedback from and providing additional information to individual participants through a series of interactive café sessions dedicated to the four design characteristics. The feedback received in these sessions is distilled in the body of this report. Thus the purpose of these cafés was:

- To conduct a design review and gain individual insights from academia, industry, nonprofit organizations, local and state agencies, and other stakeholders on the four areas of design as proposed in the Preliminary Design document; and
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The interactive café discussions were guided by eight representatives from the Departments of Commerce, Defense, Energy, and Education; and NASA; along with a team of facilitators. The primary role of the discussion leaders was to ensure that all the voiced ideas, concerns, and recommendations were heard and properly documented as they were intended by each stakeholder or participant, without consensus building, ranking, prioritization, or other bias. Discussions were structured around a series of leading topics, or challenges, as detailed in this report below. The sections below provide a summary of the transcripts generated at all of the café sessions held throughout the workshop and include additional input received in written form from individual participants. The comments do not necessarily represent the views of the Advanced Manufacturing NPO or its partner agencies.

Café Session Outcomes

At the conclusion of the plenary panel, attendees dispersed to their assigned café locations for discussion of the four NNMI design characteristics. The participants were separated into four equally diverse groups, and each group was led by facilitators in discussions of four café topics. In this fashion, each participant received the opportunity to understand, discuss, and comment on the topics in a small-group format, which permitted greater freedom to pursue questions. Participants engaged in active discussion and had the opportunity to provide individual inputs through questionnaires that were provided to each attendee. The sessions were generally guided by the set of topics distributed to participants intended to stimulate discussions based upon the concepts presented within the Preliminary Design report and how one would address each challenge. These topics were intended to assist in formulating individual participant thought. Notes were taken during each café, and the completed questionnaires were collected at the end of each period. The notes and questionnaire responses from the cafés provide the basis for the following summaries. The responses were for the most part extremely positive, indicating that the stakeholders are strongly supportive of the NNMI program and its preliminary design.

Café Discussion Topic 1: Technologies with Broad Impact

For its particular technology focus area, each Institute should be designed to address issues related to the “industrial commons,” or the collective research and development (R&D), engineering, and manufacturing

capabilities that sustain innovation. This includes addressing shared problems throughout the supply and/or value chain and across multiple end-use applications. The stage of the selected technology areas is envisioned to be within TRL 4-7, whereby process economics are further clarified and scale-up issues are better defined and quantified. Further, the Institutes should have strategies for transitioning and implementing to larger-scale production beyond Institute operations.

Throughout café Discussion 1 sessions, participants expressed their opinions related to the technology focus areas for the Institutes, as described in the document, “*National Network for Manufacturing Innovation—A Preliminary Design*”. The nature of the technologies described, namely those with a regional focus but national and international aspirations, in an open competition without pre-determined topics, and with the goal of maximizing industry impact, were consistently complimented and confirmed as proper. The Café discussion should be broadly recognized as enthusiastic support of the preliminary design. The detailed discussion, roughly bounded by three questions, included a wide range of topics addressing issues related to the “industrial commons” or the collective R&D, engineering, and manufacturing capabilities that sustain innovation as well as the metrics that could be used to justify the focus area. This included addressing shared problems throughout the supply and/or value chain and across multiple end-use applications.

1.1 How could a proposing team select a well-defined focus area that meets both industry and national needs?

Throughout the discussion a variety of high-level ideas emerged from the participants in the following general categories;

- *Suggested examples of focus areas.* The attendees mentioned these in particular: alternative energy, cyber security, light materials, energy shortage, food needs, water distribution, terrorism, reducing greenhouse gasses, energy dependence, lasers (laser cutting, laser sintering, laser marking, laser tracking and welding), machining, metal functioning, and joining as examples of well-defined focus areas.
- *Solicitation process.* Some suggested that the government should solicit white papers on topic areas, then down-select prior to requesting full proposals. Others suggest a more open model that does not down select based on white papers be followed. Similarly, some noted the risks of hundreds of teams expending limited resources on unsuccessful proposals.
- *Supply chain.* As much as possible, understand the entire value chain (from research to end user); this understanding will be reflected in performance, reliability, and cost targets. This will better inform businesses developing production and test equipment. These are good small and medium-sized enterprise opportunities that are also synergistic with shared facilities.
- *Collaboration.* Collaborative efforts are a must for success. Has a regional industry sector come together with small manufacturers? Has this group identified the needs on both sides? Even competitors coming together for idea sessions will benefit the industry as a whole in the long run.
- *Sustainability.* Technologies and types of companies chosen should have real business plans to move forward and be sustainable. Those that speak to the whole supply chain will create the most future jobs and opportunities.

1.2 What metrics could be used to help justify the selected focus area (s) and scale of effort?

The discussion among participants led to many possible metrics in four groupings:

- Percentage of workforce engaged in manufacturing that has a regional, national, and international demand. Percent of regional gross domestic product derived from a sector. Identify strategic investment for the long term (10 to 20 years).
- Increased jobs, increased productivity, number of people helped, number of new companies started, amount of revenue generated, specific number of critical materials and processes eliminated, assumed domestic and global profit, benefit and potential for economic growth and transition to the manufacturer's product, return on investment.
- Collaboration and connectivity on broad reaching technologies should be measured. (There needs to be a mechanism for free-form collaboration.) Results could be measured based upon the mode of collaboration and the tools used.
- Examine the state of metrics for industry and the nation, benchmark them against international companies, add forecasted trends to these data, and select the "top" ranked area where U.S. industry is looking for assistance and the nation would disproportionately benefit from enhanced competition.

1.3 How would you design an Institute with a regional focus and position the Institute to create national/ international technical preeminence? Is it possible to do this with Industry, technology, or process and product focused Institute agenda?

Below are major opinions expressed by participants during the discussion, arranged in groups by no priority order:

- The purpose of the Institutes is primarily job creation and creating capability in the United States. From that perspective, a group of universities and community colleges in a regional area gives you the education and training part and the central institution location, but industry is located all across the country, so the people and talent could then move on to wherever to work. There should be a local focus for education and small and medium-sized enterprises in the area. But the Institutes are supposed to create expertise.
- Regional focus areas should include academia and universities because they bridge the gap between industry; science, technology, engineering, and mathematics; and elementary and secondary education. Regional focus offers potential to organically build new industries and a new economy. However, this could take some time.
- Regional impact. A broad, crosscutting technology theme is relevant to the entire nation; however, the greatest impact is local, and geography matters. Having Institutes that focus on a particular regional cluster (for example, automotive in the Southeastern United States) is not necessary to have regional impacts.
- Incremental success. Look at the challenges facing the region, and then pull together some initial quick-win projects. Build success in small increments and build out. Be careful that political interests are kept far removed and out of the selection process.
- Tech transition: "boots on the ground." Local and regional engagement is essential to identify companies with innovative ideas to advance and identify those companies or startups for commercialization. Also, involve the manufacturing extension partnerships along the way in

project review to help advance technology readiness levels. This is cross-functional: a combination of national and industry organizations and regional groups.

- Use of small and medium-sized enterprises. Know-how and small and medium-sized enterprise capacity development should be the main focus; it will naturally occur in the regions. Regions should be flexible. The only constraint should be avoiding major “global” suppliers and developing local and national suppliers.
- National and international focus. A regional focus will not, except under unusual circumstances, sustain an Institute. Therefore, national and international preeminence is required for sustainability. National meetings of professional societies, international meetings, and Institute workshops will help. A national focus to reach companies must come after developing the regional focus.
- Use of IMIs. Develop the IMIs in areas that already have a strong manufacturing base to ensure early success. Then establish satellite regions and establish their regional developments as one of the metrics to ensure that the benefits are being distributed nationally.
- Use existing facilities. Regional concepts and great ideas still may require a non-regional entity with unique contributions or big user facilities. In short, regional can be good, but don’t isolate, or you can lose crucial capabilities for success.

Café Discussion Topic 2: Institute Structure and Governance

Each Institute is envisioned to be a public-private partnership composed of many different types of organizations. Also, each Institute is envisioned to have a clearly defined mission, goal, and structure. Consequently, it is important for each Institute to function under a coherent framework with well-managed operating procedures that allow for flexibility. It will be important for the Institutes to demonstrate the capability to manage the complexity and diversity of the participating entities for successful Institute performance.

Topic 2 gave workshop participants an opportunity to consider the operational structure of IMIs proposed in *National Network for Manufacturing Innovation—A Preliminary Design*.

2.1 The NNMI preliminary design calls for an Institute to be led by an independent, not-for-profit organization. How then should an Institute leverage academic and regional resources, interface effectively with these and other key stakeholders, and manage intellectual property obligations?

The participant dialogue on this question centered on the following four main topics, and affirmed the preliminary design document:

- Nonprofits: new vs. existing: Opinions varied widely on the idea that only a new nonprofit organization could lead an Institute. Some agreed, saying that a new nonprofit is the correct approach, since it would be able to start from scratch and assemble the right board and management from the beginning. On the other hand, many wondered why existing entities weren’t considered, because of the experience and expertise to be leveraged. All seemed to agree that some sort of entity should be a “leader” for the institute, reflecting the appropriate relationship with industry, academia, and research organizations, but what type was highly debated.

- **Intellectual property:** The issue of how to handle IP rights was the most concerning aspect of the structure of the Institutes. Participants agreed that no one model would fit every Institute. Suggestions included paying a fee to get access to the technology; hiring IP consultants or having IP attorneys as members of the Institute; creating classes or levels of IP ownership (full members get full IP rights, lower tiers are limited); having open, “IP-free” spaces; entrusting IP to universities through sponsored project offices or research centers; or declaring that any resulting IP from the collective work of the Institute should be owned by the Institute. Participants felt that the constraints were not incompatible in a carefully designed and implemented collaboration environment, but they were very vocal in their agreement that any model should be decided and communicated very early on in the stand-up of the Institute.
- **Business model.** The fundamental idea that participants wanted the structure of Institutes to take into account was that the Institutes are really just businesses. Therefore, the structure needs to be based on a business model: What type of staffing? Return on investment? Legal? Workload? Capabilities? There is also a cost to running an Institute (legal, management, staff, etc.), so Institutes should define what the business needs will be first in order to help better define the structure needed. Attendees also agreed that besides a business plan, an economic development and outreach plan is needed for each Institute—this is how a Network is created and how the region is leveraged.
- **Revenue:** Attendees also discussed that while the purpose is to make innovations in manufacturing, profits will be made, and the members and the Institute as a whole will need a plan in place for allocation and future growth, cost-sharing, etc. The Institutes should remember that each member company's main goal is to support its own mission and increase revenue, so finding the right motivation for participation is a key goal.

2.2 How should participation by non-domestic organizations be managed to maximize impact to the United States? For example, how might an Institute manage participation by a multi-national organization? Should a non-domestic organization participate in or lead a project?

The most common reaction among participants to this question was that in today's global marketplace, participation by nondomestic organizations cannot and maybe should not be avoided. The international marketplace has a lot of purchasing power, and for member companies whose main goal besides the mission of the Institute is increasing their bottom line, that power cannot be ignored. Many participants indicated that for certain technologies or topics, foreign participation might be more sensitive or play different roles, but that in general, if something is unclassified and commercial, then there should not be a problem and participation should be governed by a policy as free as possible. One attendee explained, “The key will be to engage locally and plan internationally.” To take advantage of that participation, attendees discussed that the Institutes should:

- Be composed primarily of organizations that hold a presence of some sort in the United States; if a participant is a nondomestic organization, it should have a manufacturing and/or management facility in the United States.
- Figure out how to involve small (international) companies that are innovation focused and that see the United States as a new market of opportunity. It is a good practice to bring in technology if an offshore company wants to expand its market here.

Above all, good communications across all participants will be necessary.

All agreed that the goal is to maintain U.S. leadership of the technology, even though the Institute cannot then prevent the technology from leaving the United States. Also, they agreed that any resulting jobs should remain domestic. The Institute should look at how much a company has invested in its community or sponsored small manufacturing in an area, and the story behind its connection to the area (for example, it may be a multinational corporation but on the ground it behave like a local business).

One concern that attendees voiced was that the Preliminary Design document did not address the challenge of comingled funds—for instance, will the government not contribute the same amount if it's not only American companies and American jobs, or must the \$1 billion investment stay local for Congress to pass it?

Café Discussion Topic 3: Strategies for Sustainable Institute Operations

Each Institute would be catalyzed through an initial investment from the Federal Government. Each Institute should have a plan and strategy for private sector co-investment and should maintain robust performance beyond the initial federal investment. Institute members will need to demonstrate the necessary financial and strategic commitment to ensure successful operation.

In topic 3, participants discussed the long-term operational considerations of IMIs and specifically addressed ways in which return on investment might lead to long-term sustainability. Many conversations focused on cost-share arrangements, IP funding options, membership fees, long-term stakeholder roles, and the overall need for sustainability. Participants expressed a variety of well-defined strategies for generating revenue and discussed many of the challenges the Institute is likely to face. It will be necessary for the Institute to demonstrate success early in its life cycle and that the production of marketable products will be essential for sustainability.

3.1 How can an Institute sustain its operations beyond the 5-7 year mark?

Many workshop participants were in agreement that because the required resources are so great and the time frame so short, any sustainability plan must be in place as part of the initial proposed process. Organizations need to view the IMIs as go-to organizations for 4- to 7-year R&D in each specified technology area. If government doesn't use the Institutes as a core resource, then industry might lose interest. Early successes and a quick return on investment will inevitably have to be driving forces behind any initial plans.

While participants recommended a wide variety of initial sustainment options, several common themes emerged from the discussion:

- We need to show industry a return on investment and prove that projects can be supported based on this return on investment.
- One possible method suggested is to allow the Institute to reap profits and spin off private companies.
- A decision must be made concerning how the Institutes will network with one another. Private industry is likely to see more value in the Network than in single Institutes.
- There is a concern regarding the availability of funds beyond the initial budget cycle.
- Part of the problem with the current structure is that it is seen as blocking out nonprofits. Existing 501(c)(3)'s could provide valuable input.

- Institutes must be sustainable after 5 to 7 years and will not receive further NNMI funding; however they can pursue other government funding. The NNMI program is intended to establish infrastructure, other revenue sources will have to sustain the infrastructure once it's established. Some of those could be government sources.
- There was some support for an idea that the Institutes should not be sustained beyond 7 years and should simply develop technologies and then disband.

(a) How can an Institute unlock private investment? What strategies could be followed to attract partners, with particular attention to infrastructure and shared use facilities, training and education, and other Institute “products”?

Clear objectives and well-defined metrics for success are fundamental to attracting all forms of investment. In the initial stages of planning and implementation of the IMIs it will undoubtedly be necessary to provide certain incentives to attract industry participation. These could include initially discounted membership rates, low cost and accessible training for the employed workforce, supply chain group discounts, and open access to fabrication shops for subject matter experts. The IMIs will ultimately require multiple streams of investment, which can be generated by demonstrating their benefits to the private and public sectors.

Participants suggested a wide array of revenue-generating strategies. The most commonly agreed-upon ones included these:

- Open the labs to the general public and charge fees for access to the equipment and/or advice on obtaining patents
- Invest in equipment that is of commercial value
- Establish policies dictating that a small percentage (perhaps 0.5%) of the long-term profits be allocated to the Institute from which the product came
- Divide lab membership into tiers, with some tiers offering greater access for a greater fee

Participants also suggested that

- Some private organizations might be willing to donate IP to the Institute that would be capable of generating long-term profits
- One challenge will be that the IMIs don't want to end up in a situation where the different Institutes are competing with one another for resources

(b) What might a sustainable Institute budget look like? How would an Institute's diverse funding sources evolve with time?

It is of the utmost importance that the IMIs' budgets come from diverse funding streams that are not susceptible to consistent disruption. These sources of funding should result from a combination of long-term investments from states and universities combined with revenue from IP and *a la carte* sponsored research grants. Members in the IMIs should not only be expected to pay fees for use of the Institute's resources but must also be counted on to contribute resources of their own to reduce the overall overhead. Finally, any initial budget planning must include both a short-term plan for the IMIs' initial standup and a plan for their long-term sustainment.

Participants had the following comments to offer on the formation of a sustainable budget:

- Institutes should have broad revenue streams with no one stream responsible for more than 25% of funding.
- The Institute should have a marketing component that looks at all output—both failures and successes—to find other possible opportunities.
- The Institute could develop a franchise to expand the reach of the products it develops and then turn around and sell the franchises.
- The Institute should utilize the resources of its members to keep overhead costs low. Each member should provide x number of employees to the effort. If one company's technology proves better than another's, then everyone could adopt the best technology and benefit from it.
- It is necessary to track all new companies for the first 5 years. Once a new company is in the right position, the Institute should ask it to start investing back in the IMI.
- A portion of the membership fees should be invested to set up an endowment for the Institute.

3.2 What might be some go/no go criteria for uninterrupted flow of NNMI funds to an Institute?

The Institutes must show success early on at creating jobs, innovating technological transformations, and providing training and education to the next generation of technical workers as well as the preexisting workforce. Success in these areas is essential to long-term sustainment of the IMIs. However, if these goals cannot be accomplished within the first few years of the Institutes' existence, then their continued funding should rightly be called into question.

Participants had quite varied opinions of what constituted go and no-go scenarios for the continued flow of NNMI funds to an Institute. However, continued expansion in capabilities and client base remained a constant theme. Other ideas included these:

- The Institute's positive impact on jobs and the economy is a must for continued funding
- Attracting partners both foreign and domestic is a definite "go" requirement
- Sustained support is a requirement for the Institutes' continued access to funding
- A complete 360-degree review should be done of the program in year 3 or 4 to determine whether funding should continue
- Continued attraction and retention of clients over time is absolutely necessary
- There should be growth in client-funded engagements to support growth in capabilities
- Industry must be assured that the government funding is not going to dry up
- Lack of broad-based industry support is an obvious no-go situation
- Metrics for determining success could be the number of new members created or new projects started

Café Discussion Topic 4: Workforce Training and Education

The availability of qualified workers is essential to the scale-up of new manufacturing technologies. Manufacturing competitiveness in an era of rapid technological and market change requires workers to have advanced skills and the foundational knowledge to quickly obtain new skills. Developing and enhancing the skill set of current, displaced, and new employees will be critical for Institute success.

In Topic 4 workshop participants discussed the requirements for the workforce, strategies for developing and delivering training and educational materials, and the role of the Institute in workforce development. The availability of qualified workers was seen as essential to scaling up new manufacturing technologies. Manufacturing competitiveness in an era of rapid technological and market change requires workers to have advanced skills and the foundational knowledge to quickly obtain new skills. Developing and enhancing the skill set of current, displaced, and new employees will be critical for Institute success. This café topic was informed by the design tenets documented in the Preliminary Design *report* and presented during the morning session, and it was structured around the two questions below. Participants concurred with most of the design tenets, with some additional comments that expanded on the goals of the workforce Institute component by providing more information on how these goals could be reached using existing programs, either through partnering or adopting successful models. Many stakeholders welcomed the inclusion of Workforce Development in the NNMI program, and were again supportive of this aspect of the preliminary design. A central theme running through the discussion was the need to plan for advocacy and communication as much as technical expertise and certifications.

4.1 How can an Institute exercise industry leadership with other key stakeholders in workforce training and development?

Workshop participants were in broad agreement that IMI industry leadership should look to partner with existing education and training programs instead of inventing a new set of workforce activities. Further discussions revolved around the need for a structured approach to serve the continuum of workforce requirements, from K-12 engagement to community college and university curriculum efforts, including existing workers. There seemed to be difference between the universal needs of the next generation of the manufacturing workforce and the specific knowledge and experience needed in the technology focus area of a particular Institute. It was suggested that the NNMI would best provide the universal manufacturing skillset (manufacturing methods, digital environment, 3D Technical Data Package, etc.), while the individual IMIs would provide the technical skills, experience, and certification for their specific technology focus area. This two-level approach would provide a common core structure most efficiently. Other key observations were strong support for an apprentice education model featuring co-op and internship opportunities, the shared use of IMI facilities for education and R&D activities, and even attention to workers with associate's, bachelor's, or graduate degrees, as well as more mature, existing workers.

Some specific answers to this question emerged from the discussion as common themes:

- Develop low-cost, hands-on camps for youth that focus on technology and manufacturing. Work with local industries to develop the camps.
- Each Institute should establish a body of knowledge and act as a certification outlet.

- We've been more concerned with creating faculty to teach students or publish research instead of creating industry leaders. The Institutes should establish different incentives to drive college and university behavior.
- Teachers do not feel knowledgeable enough about manufacturing to effectively teach or develop curriculum. We need to train and provide opportunities to teachers and not focus just on students.
- Each Institute must feature continuing education for the middle-aged workforce, which possess lots of industry "builder" experience but needs different skills.
- The jobs will come back on shore, but they will not look like the jobs that left. They will be smart and digital. We should be training for the future, not current, needs.
- Industry needs to develop apprenticeships and internships, at all levels—it's not just academia's responsibility to teach people. This can be done collaboratively.
- An IMI should be a dual-use facility: training and research. When the research is not being conducted, training could easily take place.
- Many challenges are out there—the Moon Buggy competition, Underwater Fuel Cell Challenge, Team America Rocketry Challenge, FIRST Robotics—but the competitions are not connected; they don't build off one another. This effort could be organized by the NNMI to create a continuum.

4.2 How should an Institute be responsive to a region's workforce development and training priorities, and pursue initiatives that are responsive to the nation's needs?

Participants suggested a number of strategies to provide regionally oriented workforce development initiatives using Institute membership and resources. The most commonly agreed-upon ones included assessing the industry requirements and present workforce gaps, developing an internship network with regional companies to provide experience, and advocating manufacturing as a high-tech career choice from K-12 through universities.

- What about the middle-aged and current workforce? How do we train or retrain them? An Institute could do this region by region very well. It could assess the workforce and determine the region's needs.
- Need to educate small and medium-sized enterprises about technology options to understand the value of making the next step in advanced manufacturing (machining to computer numerical control, computer numerical control to 3D modeling, then to model-based engineering using new manufacturing technologies).
- Start regionally in focus and let it scale up nationally as it goes. Initial power is regionally focused.
- Regional industry IMI members should collaboratively develop programs to provide worker training through community colleges. K-12 should focus on outreach and involvement of students for manufacturing as a high-tech career choice.
- Students may be smart, but they have no experience. Student interns display skills. Therefore they can demonstrate value and have skills that are not available elsewhere. The Institutes should focus on providing experience with advanced manufacturing tools.

- Utilize the equipment in member companies for training; invite students and companies outside the region to tour the facility; and integrate the equipment into the curriculum.
- Let the NNMI focus on broad national manufacturing training, then have each Institute contribute its best practices to the national Network and manage its own technology-focus training.
- Use existing co-op internship programs at regional universities and community colleges to develop a “certificate” qualification for new technologies. This would be a revenue stream for the Institute.

Summary

The café sessions were informed by and continued to build upon the NNMI preliminary design tenets captured during the 2012 activities of the Advanced Manufacturing NPO. The stakeholders provided extremely positive feedback that demonstrates the manufacturing sector is enthusiastic about the NNMI program and the preliminary design presented at the workshop. This is but one example of the benefits which can be attributed to the workshop format and discussion sessions that were conducted as part of this Blueprint for Action.

This report summarizes the enthusiastic response of the manufacturing stakeholders, and their support of the NNMI program as expressed during the Café Sessions. All of the attendees, representing government, industry, academia, and economic development organizations, welcomed the initiative, approved of the design, and provided very positive feedback.

Appendix A: List of Abbreviations

NPO	National Program Office
IMI	Institute for Manufacturing Innovation
IP	intellectual property
NASA	National Aeronautics and Space Administration
NIST	National Institute of Standards and Technology
NNMI	National Network for Manufacturing Innovation
NSTC	National Science and Technology Council
R&D	research and development
RFI	request for information
TRL	Technology Readiness Level

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Appendix B: List of Participants

Last Name	First Name	Organization	Sector
Adams	George	Purdue University	Academic
Alexander	Iwan	Case Western Reserve University	Academic
Alford	Charles	UES, Inc.	Industry
Allen	James	Dynetics, Inc.	Industry
Aller	Mike	Space Coast Energy Consortium	Economic dev.
Altman	Michael	University of Alabama in Huntsville	Research, nonprofit
Aptekar	Noah	State of Colorado	Economic dev.
Auffart	Adam	Purdue University	Economic dev.
Bagg	Stacey	NASA	Govt., federal
Ballentine	Paul	University of Rochester	Economic dev.
Barkman	Bill	Y-12 National Security Complex	Other
Barnoon	Barak	Pfizer	Industry
Basu	Prabir	NIPTE, Inc.	Research, nonprofit
(Berry) Bell	Sheila	RS Electronics	Industry
Bennett	Gregory E	Alabama Technology Network	Research, nonprofit
Bennett	Andrew	Perkins+Will	Other
Bennett	Kristin	KB Science, LLC	Govt., federal
Bernaden	John	Rockwell Automation	Industry
Bishop	Brian	EWI	Research, nonprofit
Blue	Craig	Oak Ridge National Laboratory	Govt., federal
Boeman	Ray	Oak Ridge National Laboratory	Govt., federal
Bohlmann	Brad	University of Minnesota	Academic
Boles	Ronald	General & Automotive Machine Shop	Industry
Bowman	J. Michael	Delaware Technology Park, Inc.	Research, nonprofit
Bowman	Keith	Illinois Institute of Technology	Academic
Brown	Greg	Brown Precision, Inc.	Industry
Brown	Arthur	Unincorporated South Fulton County— Economic Development Initiative	Govt., state or local
Buie	Harold	System Technology Associates, Inc.	Industry
Burghgrave	Brian	Deere & Company	Industry
Busbey	Micheal	Hunt Design and Manufacturing	Industry

Last Name	First Name	Organization	Sector
Busnaina	Ahmed	Northeastern University	Research, nonprofit
Camp	Lisa	Case Western Reserve University	Academic
Campbell	Kevin	Northrop Grumman Corporation	Industry
Canfield	Stephen	Tennessee Tech University	Academic
Cape	Lucia	Huntsville Chamber of Commerce	Economic dev.
Caruso	Pam	NASA	Govt., federal
Cazalet	David	Pellissippi State Community College	Govt., state or local
Ceulemans	Steve	Birmingham Business Alliance	Economic dev.
Christensen	Michael	Dynamics Research Corporation	Govt., federal
Christian	Leigh	AMTEC Corporation	Industry
Ciesinski	Michael	FlexTech Alliance	Research, nonprofit
Clardy	Stephen	Lockheed Martin Space Systems Company	Industry
Cohen	Paul	North Carolina State University	Academic
Colagross	Glenda	Northwest-Shoals Community College	Academic
Colaneri	Nick	ASU	Govt., state or local
Colberg	Wendell	NASA	Govt., federal
Cole	Daniel	Northrop Grumman Corporation	Industry
Conrardy	Chris	EWI	Research, nonprofit
Cook	Floyd	Boeing	Industry
Cooper	Ken	NASA	Govt., federal
Corson	Paul	Lorain County Community College	Economic dev.
Cukier	Michael	Whirlpool Corporation	Industry
Cummings	Michael	Dubois Strong	Economic dev.
Daehn	Glenn	Ohio State University	Academic
Daly	Chris	The Enterprise Center	Economic dev.
Damoulakis	John	University of Southern California— Information Sciences Institute	Academic
Daniels	Edward	Argonne National Laboratory	Govt., federal
Darby	LaVa	D & H Transportation Logistics	Govt., federal
Davis	Rick	Birmingham Business Alliance	Economic dev.
Davis	Virginia	Auburn University	Academic
Dawson	Mike	Jacobs/MAF	Industry
Day	Ralph	ANSER (Office of the Secretary of Defense ManTech Support)	Govt., federal
Dean	Scott	Cray, Inc.	Industry

Last Name	First Name	Organization	Sector
Deason	Douglas	Missile Defense Agency	Govt., federal
Defazio	Kelly	Lockheed Martin Corporation	Industry
DeMuth	Grant	City of Guntersville	Govt., state or local
Devall	Tom	Auburn University	Academic
Diaddario	David	Radiance Technologies	Industry
Dinon	Douglas	General Electric Global Research	Industry
Donnellan	Thomas	Pennsylvania State University—Applied Research Lab	Academic
Dotson	Dennis	Dotson Iron Castings	Industry
Dreher	James	Durham Boat Company, Inc.	Industry
Dress	David	NASA Langley Research Center	Govt., federal
Dressen	Tiff	University of California, Berkeley	Academic
Dugenske	Andrew	Georgia Institute of Technology—Manufacturing Institute	Academic
Dumont	Robert	TMTA	Industry
Dunn	Michael	ANSER (Office of the Secretary of Defense ManTech Support)	Govt., federal
Edwards	Kali	Rockwell Automation	Industry
Eidsaune	Roger	Dynetics, Inc.	Industry
Elsken	Kevin	Bayer MaterialScience, LLC	Industry
Engelhardt	Michael	Autodesk, Inc.	Industry
Evans	Paul	Southwest Research Institute	Research, nonprofit
Fielding	Jennifer	Air Force Research Laboratory	Govt., federal
Fikes	John	NASA Marshall Space Flight Center	Govt., federal
Fish	Chris	McAllister & Quinn, LLC	Govt., federal
Flannigan	William	Southwest Research Institute	Research, nonprofit
Fleegle	Gary	NCDMM	Industry
Fraday	Kris	Clemson University Center for Workforce Development	Academic
Franta	Tim	Space Coast Energy Consortium	Other
Frost	Scott	ANSER (Office of the Secretary of Defense ManTech Support)	Govt., federal
Fry	Michele	Young Innovators' Society	Academic
Fudickar	Bob	NASA Michoud Assembly Facility	Govt., federal
Gallinger	Jon	Electric Power Research Institute	Research, nonprofit
Gamez	Manuel	Raytheon Missile Systems	Industry

Last Name	First Name	Organization	Sector
Giles	Merle	University of Illinois—National Center for Supercomputing Applications	Govt. state or local
Gillespie	John W.	University of Delaware	Academic
Gilmore	James	NCDMM	Industry
Girard	Michael	Aerojet	Industry
Goggin	Heather	ADECA Energy Division	Govt., state or local
Gonzalez	Miguel	University of Texas—Pan American	Academic
Goodstein	Mark	Smart Manufacturing in California & SMLC	Other
Gordon	Mark	NCAT	Research, nonprofit
Gore	Patricia	Missile Defense Agency	Govt., federal
Graham	Charlene	Industrial Properties of the South	Industry
Grieves	Michael	University of Iowa	Academic
Gupta	Jatinder	University of Alabama in Huntsville	Academic
Hahn	Gail	Boeing	Industry
Hamm	Mitch	Alabama Technology Network	Govt., state or local
Hanna	Joe	Auburn University	Academic
Hardy	David	U.S. Department of Energy	Govt., federal
Harney	Paul	Perkins+Will	Other
Harris	Gregory	Army Aviation and Missile Research Development and Engineering Center—Mfg. Science & Technology Div.	Govt., federal
Hayashi	Steven	General Electric Global Research	Industry
Headrick	Sherri	Janson Communications	Govt., federal
Heider	Dirk	University of Delaware	Academic
Helvajian	Henry	The Aerospace Corporation	Research, nonprofit
Hendrick	Shar	The Hendrick Group, LLC	Industry
Henrick	Richard	Sanmina Corporation	Industry
Henschel	Gregory	U.S. Department of Education	Govt., federal
Hicks	Don	University of Texas, Dallas	Academic
Higdon	Clifton	Eaton	Industry
Hill	Curtis	CK Technologies	Govt., federal
Hill	Jamie	LSINC, LLC	Industry
Hill	Courtney	CJ Hill Consulting Services	Industry
Hislop	Alan	SCI Technology, Inc.	Industry
Hodges	Jimmy	Wallace State Community College	Academic
Holden	Anthony	University of Alabama in Huntsville—Alabama Technology Network	Academic

Last Name	First Name	Organization	Sector
Holloway	Nancy	NASA Langley Research Center	Govt., federal
Holton	Debbie	Society of Manufacturing Engineers	Industry
Hopper	James	EnergySolutions	Other
Hryn	John	Argonne National Laboratory	Research, nonprofit
Hurt	Pamela	Society of Manufacturing Engineers	Industry
Janson	Christopher	New York State Center of Excellence in Bioinformatics	Economic dev.
Jarman	Rick	National Center for Manufacturing Sciences	Research, nonprofit
Jawahir	I. S.	University of Kentucky—Institute for Sustainable Mfg.	Academic
Jennings	Paul	University of Tennessee—Center for Industrial Services	Economic dev.
Johns	Derek	Venturi, Inc.	Industry
Johnson	Alan	Vincennes University—Jasper Campus	Academic
Jones	Clyde	NASA	Govt., federal
Jones	Rose	Northwest-Shoals Community College	Academic
Kania	John	Applied Materials, Inc.	Industry
Kerzicnik	Ernest	Enginuity, LLC	Industry
Kessler	William	Georgia Tech	Academic
Kintzel	Edward	Western Kentucky University—NOVA Center	Academic
Kirkpatrick	Wallace	DESE Research, Inc.	Industry
Kleckner	Kevin	Raytheon Missile Systems	Industry
Knowles	Brian	Turner Construction	Industry
Knowles	Dave	LEAN Frog Business Solutions, Inc.	Other
Koshut	Erin	AkinsCrisp Public Strategies	Industry
Koshut	Tom	University of Alabama in Huntsville	Academic
Koubek	Richard	Louisiana State University	Govt., federal
Kox	Dennis	Raytheon	Industry
Kramer	Dan	Ohio State University—College of Engineering	Academic
Lamm	Tracy	Lockheed Martin Corporation	Industry
Layne	Rick	Southeast Tennessee Development District	Govt., state or local
Lee	Humphrey	Northwest-Shoals Community College	Academic
Leeper	Lynn	AZ Technology, Inc.	Industry
Leonard	Scott	ProMan Technologies, LLC	Govt., federal
Lercel	Michael	SEMATECH	Research, nonprofit

Last Name	First Name	Organization	Sector
Levinson	Rachel	Arizona State University	Academic
Liang	Richard	Florida State University	Research, nonprofit
Linder	Steve	Office of the Secretary of Defense— Manufacturing and Industrial Base Policy	Govt., federal
Liou	Frank	Missouri University of Science and Technology	Academic
Littles	Jerrold	Pratt & Whitney Rocketdyne	Industry
Lloyd	John	Michigan State University	Academic
Lo	Grace	Majestic Solutions, Inc.	Industry
Lombardo	Dale	General Electric Power & Water	Industry
Lopez	Thomas	Parsons	Industry
MacPherson	Jacqueline	Festo Corporation	Industry
Maly	Joseph	NDCC	Economic dev.
Maresca	Louis	University of Texas—Pan American	Academic
Matsuura	Anne	The Optical Society	Research, nonprofit
Maxwell	James	Dynetics, Inc.	Industry
McAvoy	Stuart	UPS / LCMS	Industry
McBride	Charlie	Louisiana Center for Manufacturing Sciences	Industry
McConnell	Don	Georgia Tech	Research, nonprofit
McDaniel	Giles	Shoals Entrepreneurial Center	Economic dev.
McInnis	John	Nakuset Associates	Industry
McIntyre	Cynthia	Council of Competitiveness/NDEMC	Research, nonprofit
McQueen	Travis	Dubois County Airport Authority/Huntingburg Airport	Industry
Mears	Laine	Clemson University	Academic
Miller	Dennis	Y-12 National Security Complex	Govt., federal
Ming	Alan	Crag, Inc.	Industry
Mittal	Manoj	University of Texas at Arlington Research Institute	Academic
Molnar	Michael	National Institute of Standards & Technology	Govt., federal
Moncrieff	Laurie	Adaptive Manufacturing Solutions	Industry
Moreira	Robert	U.S. Army Research, Development and Engineering Command—Armament Research, Development and Engineering Center	Govt., federal
Morris	Ed	Lockheed Martin Corporation	Industry

Last Name	First Name	Organization	Sector
Mukasa	Samuel	University of New Hampshire	Academic
Murphy	Lisa	Atura Integration	Industry
Nahass	Paul	Aspen Aerogels	Industry
Neal	Richard	IMTI	Research, nonprofit
Nelson	Edward	Unincorporated South Fulton County—Economic Development Initiative	Govt., state or local
Nelson	Georgette	Concurrent Technologies Corporation	Research, nonprofit
Newkirk	Joseph	Missouri University of Science & Technology	Academic
Nowinski	Caralynn	University of Illinois	Economic dev.
Oakes	James	ATI	Industry
Ogburia	Sylvanus	Magnet Business Solutions	Industry
Ogles	Mike	Geocent	Industry
Olson	Katie	World Business Chicago	Govt., state or local
Ordonez	Erick	NASA Marshall Space Flight Center	Govt., federal
Ott	Ron	Oak Ridge National Laboratory	Govt., federal
Otterman	Nadine	Young Innovators' Society	Research, nonprofit
Partridge	Harry	NASA	Govt., federal
Patibandla	Nag	Applied Materials, Inc.	Industry
Patrick	Buzz	Tech 20/20	Economic dev.
Peaslee	Kent	Missouri University of Science & Technology	Academic
Pelfrey	Rick	Savannah River National Laboratory	Govt., federal
Penn	Wayne	Alabama Laser	Industry
Peters	Christopher	The Lucrum Group	Industry
Phillips	David	CohesionForce, Inc.	Industry
Pickens	Joseph	Concurrent Technologies Corporation	Research, nonprofit
Pieplow	Thomas	Athens State University	Academic
Pinnix	Travis	The Pinnix Group, Inc.	Industry
Prucha	Thomas	American Foundry Society	Industry
Pruitt	Jeffrey	Top of Alabama Regional Council of Governments	Economic dev.
Quinn	Tracey	University of Chicago	Academic
Ramsey	Douglas	Alcoa	Industry
Rangarajan	Arvind	PARC	Industry
Raupp	Gregory	Arizona State University	Academic

Last Name	First Name	Organization	Sector
Ravani	Bahram	University of California—Davis	Academic
Reardon	Patrick	University of Alabama in Huntsville	Academic
Resnick	Ralph	NCDMM	Industry
Reutter	John	Drake State Technical College	Academic
Rice	Melissa	Snead State Community College	Academic
Rivero	Iris	Iowa State University	Academic
Robertson	Rodney	Auburn University Huntsville Research Center	Academic
Robinson	Kem	Lawrence Berkeley National Laboratory	Research, nonprofit
Rogers	Tom	Oak Ridge National Laboratory	Govt., federal
Rooks	Ron	Bishop-Wisecarver Corporation	Industry
Rothrock	Ginger	RTI International	Research, nonprofit
Rung	Robert D.	ONAMI	Economic dev.
Russell	John	Air Force Research Laboratory	Govt., federal
Ryan	Marty	SCRA	Research, nonprofit
Saieed	Dan	Hamilton County Government	Govt., state or local
Sample	Jack	ERMC	Industry
Sampson	Doug	JRC Integrated Systems	Industry
Sanders	Robby	Tennessee Tech University	Academic
Savoie	Robert	Geocent	Industry
Scales	Charles	Sierra Lobo, Inc.	Industry
Schaum	Pete	Alabama Department of Commerce	Govt., state or local
Schen	Michael	National Institute of Standards & Technology	Govt., federal
Schmid	Steven	National Institute of Standards & Technology	Govt., federal
Schneider	Dean	Texas Center for Applied Technology	Academic
Schramko	Ken	Lam Research	Industry
Scotti	Stephen	NASA Langley Research Center	Govt., federal
Sczechowski	Jeffrey	University of Colorado—Boulder	Academic
Semmes	Edmund	USfalcon, Inc.	Industry
Shade	Steve	Purdue University	Academic
Sharpe	Jonathan	Lockheed Martin Space Systems Company	Industry
Shaw	Bruce	CohesionForce, Inc.	Industry
Shelton	Joey	TriVector Services	Govt., federal
Shinbara	Tim	Association for Manufacturing Technology	Industry

Last Name	First Name	Organization	Sector
Singer	Chris	NASA Marshall Space Flight Center	Govt., federal
Singerman	Phillip	National Institute of Standards & Technology	Govt., federal
Slevin	Chris	Office of Senator Sherrod Brown	Govt., federal
Smith	Scott	National Institute of Standards & Technology	Govt., federal
Somu	Sivasubramanian	Northeastern University	Academic
Spalt	Chad	Raytheon	Industry
Starr	Thomas	University of Louisville	Academic
Stelson	Kim	Center for Compact and Efficient Fluid Power	Academic
Stewart	Jack	PPT	Industry
Street	Nena	Global Robotics Innovation Park	Industry
Stretz	Holly	Tennessee Tech University	Academic
Swink	Denise	Smart Manufacturing Leadership Coalition	Research, nonprofit
Sykes	Parker	SME	Industry
Szczur	Don	USI (Army ManTech Support)	Govt., federal
Tate	LaNetra	NASA	Govt., federal
Taub	Alan	University of Michigan	Academic
Taylor	Rebecca	National Center for Manufacturing Sciences	Research, nonprofit
Teter	David	Los Alamos National Laboratory	Other
Thoma	Dan	Los Alamos National Laboratory	Govt., federal
Thompson	Jeff	University of Alabama in Huntsville	Academic
Thompson	Dennis	SCRA Applied R&D	Research, nonprofit
Tookes	Milton	26-North, Inc.	Industry
Tramel	Terri	NASA	Govt., federal
Underwood	Mike	SCI Technology, Inc.	Industry
Upadhyay	Ram	General Electric Global Research	Industry
Utley	Thomas	Raytheon	Industry
Vaghela	Ameet	Lockheed Martin Corporation	Industry
Vairamohan	Baskar	EPRI	Research, nonprofit
Vanderslice	Eric	Geocent	Govt., federal
Vandiver	Emily	System Technology Associates, Inc.	Industry
Vickers	John	NASA	Govt., federal
Visconti	Kelly	U.S. Department of Energy	Govt., federal
Wang	Ben	Georgia Tech Manufacturing Institute	Govt., state or local

Last Name	First Name	Organization	Sector
Wang	Paul	Mississippi State University	Academic
Ward	Brynne	DRC (Office of the Secretary of Defense ManTech)	Govt., federal
Wen	John	Rensselaer Polytechnic Institute	Academic
White	Jeremy	ANSER (Office of the Secretary of Defense ManTech Support)	Govt., federal
Wilbourn	Brooks	Kuehne-Nagel, Inc.	Other
Williams	Ben	Teledyne Brown Engineering	Industry
Wilson	Chris	Tennessee Tech University	Academic
Woods	Hamilton	Accutrol, LLC	Industry
Woods	Virginia	Accutrol, LLC	Industry
Woodward	Alexa	Clemson University	Academic
Wright	John	PESA Switching Systems, Inc.	Industry
Wright	Shannon	TS3 Technology, Inc.	Industry
Wulczyn	Heidi	TC2	Industry
Yehiely	Fruma	Northwestern University	Academic
Young	Roger	InfoPro Corporation	Industry
Yuan	Fuh-Gwo	North Carolina State University	Academic
Ziegert	John	University of North Carolina—Charlotte	Academic

Appendix C: Workshop Agenda

7:00 am **Registration and Southern Breakfast** (Lobby, Davidson Center for Space Exploration)

Plenary Session (Davidson Center Auditorium)

8:00 am **Call to Order**

Ms. Adele Ratcliff, Director, Manufacturing Technology, Department of Defense

8:05 am **Welcoming Addresses**

City of Huntsville

Mr. Thomas M. “Tommy” Battle, Jr., Mayor of Huntsville

University of Alabama in Huntsville

Dr. Robert A. Altenkirch, President, the University of Alabama in Huntsville

NASA Marshall Space Flight Center

Mr. Patrick Scheuermann, Director, NASA Marshall Space Flight Center

Keynote Addresses (Davidson Center Auditorium)

8:20 am **Department of Defense Perspective: The Importance of an Advanced, Resilient Manufacturing Base**

Mr. Brett B. Lambert, Deputy Assistant Secretary of Defense for Manufacturing and Industrial Base Policy

8:40 am **Private/Public Partnerships That Support Technology Clusters**

Dr. Phillip Singerman, Associate Director for Innovation and Industry Services
National Institute of Standards and Technology

9:00 am **The Proposed NNMI Design and Selection Process**

Mr. Mike Molnar, Director, Advanced Manufacturing National Program Office

9:40 am **Break**

10:00 am **NNMI Design Characteristics**

1. Technologies with Broad Impact

Dr. Scott Smith, Advanced Manufacturing National Program Office

2. Institute Structure and Governance

Dr. LaNetra Tate, NASA

3. Strategies for Sustainable Institute Operations

Ms. Adele Ratcliff, Department of Defense

4. Education and Workforce Development

Mr. Greg Henschel, Department of Education

12:00 pm **Today’s Design Cafés**

Mr. Mike Molnar, Director, Advanced Manufacturing National Program Office

Lunch Program (Saturn Hall)

- 12:10 pm **Lunch and Networking**
- 12:55 pm ***Plenary Panel: Perspectives in Building Technology Clusters***
Discussion Leader and Panelist:
 Ms. Rebecca Taylor, Senior Vice President, National Center for Manufacturing Sciences
Panelists:
 Mr. Ron Davis, President, Alabama Automotive Manufacturers Association
 Dr. Jennifer Fielding, Deputy Program Manager, Defense-wide Manufacturing Science and Technology, Air Force Research Laboratory
 Mr. Ralph Resnick, President and Executive Director, National Center for Defense Manufacturing and Machining
 Ms. Bethany Clem Shockney, Dean, Business/CIS, Technologies & Workforce Development, Calhoun Community College
- 1:55 pm **Army, Local Host Remarks**
 Major General William Crosby, U.S. Army, Program Executive Officer—Aviation and Missile Command
- 2:00 pm **Disperse for Cafés**
- Design Cafés***
- 2:10 pm ***Café Period I—Design Characteristics 1, 2***
Café 1: Davidson Center, Auditorium
Café 2: Davidson Center, Classroom
Café 3: Main Museum Building, Mars Grill
Café 4: Main Museum Building, Discovery Theatre
- 3:10 pm **Break** (Davidson Center, and Main Museum Building)
- 3:30 pm ***Café Period II—Design Characteristics 3, 4***
Café 1: Davidson Center, Auditorium
Café 2: Davidson Center, Classroom
Café 3: Main Museum Building, Mars Grill
Café 4: Main Museum Building, Discovery Theatre
- 4:30 pm **Reassemble for Closing Plenary**
- 4:45 pm **2013 Next Steps and Concluding Remarks** (Davidson Center Auditorium)
 Mr. Mike Molnar, Director, Advanced Manufacturing National Program Office
- 5:00 pm **Workshop Adjourns**

Appendix D: Workshop Materials



Background

About the Advanced Manufacturing National Program Office

In December 2011, former U.S. Commerce Secretary John Bryson formed the Advanced Manufacturing National Program Office (NPO). Hosted by the National Institute of Standards and Technology (NIST), the office is staffed by representatives from federal agencies with manufacturing-related missions as well as manufacturing companies and universities.

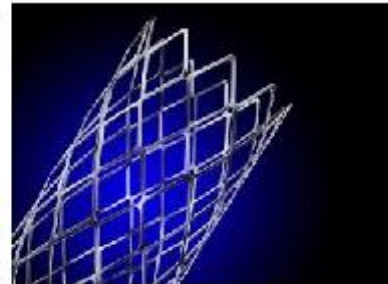
The Advanced Manufacturing NPO is charged with:

- Convening and enabling industry-led, private-public partnerships that focus on manufacturing innovation and engaging U.S. universities, and
- Designing and implementing an integrated “whole of government” advanced manufacturing initiative to facilitate collaboration and information sharing across federal agencies.

By coordinating federal resources and programs, the Advanced Manufacturing NPO will enhance technology transfer in U.S. manufacturing industries and help companies overcome technical obstacles to scaling up production of new technologies.

Mike Molnar, NIST's chief manufacturing officer, directs the office.

The Advanced Manufacturing NPO includes participation from all federal agencies involved in U.S. manufacturing. It will enable more effective collaboration in identifying and addressing challenges and opportunities that span technology areas and cut across agency missions. In addition, the office will link federal efforts to the growing number of private-sector partnerships between manufacturers, universities, state and local governments, and other organizations.



A cardiovascular stent, currently manufactured using laser cutting, is a candidate for additive manufacturing.

Federal partners include:

- | | |
|-----------------------------------|-------------------------------|
| ◆ Department of Commerce, NIST | ◆ Department of Defense |
| ◆ Department of Education | ◆ Department of Energy |
| ◆ Department of Homeland Security | ◆ Department of Labor |
| ◆ NASA | ◆ National Science Foundation |
| ◆ Small Business Administration | |

*For more information, go to the Advanced Manufacturing NPO's web site at:
<http://www.manufacturing.gov/welcome.html>*



RFI Responses & Workshop Reports

On May 4, 2012, the NIST-hosted Advanced Manufacturing National Program Office (AMNPO) published a Request for Information (RFI) in the Federal Register inviting interested parties to provide public comment on a new public-private partnership program, the National Network for Manufacturing Innovation (NNMI or Network). The proposed Network will be composed of up to fifteen Institutes for Manufacturing Innovation (IMIs or Institutes) around the country, each serving as a hub of manufacturing excellence that will help to make United States (U.S.) manufacturing facilities and enterprises more competitive and encourage investment in the U.S. The RFI sought input on the NNMI and specific input on 21 questions in four categories related to the structure and operations of the IMIs and NNMI: Technologies with Broad Impact, Institute Structure and Governance, Strategies for Sustainable Institute Operations, and Education and Workforce Development. The RFI may be found at: <http://www.gpo.gov/fdsys/pkg/FR-2012-05-04/pdf/2012-10809.pdf>. Comments in response to the RFI were due on or before 11:59 PM Eastern time on October 25, 2012.

In total, the NIST-hosted AMNPO received a total of seventy-eight (78) separate responses to the RFI from industry, academia, economic development, state and regional authorities, national laboratories, and private citizens, representing the viewpoints of nearly 107 separate entities.

In addition, the NIST-hosted AMNPO also held four *Designing for Impact* regional workshops as part of its strategy for soliciting nation-wide input on building the NNMI. The four regional workshops attracted 875 attendees from across the country, from industry; academia; economic development organizations; state, local and federal government; and others. The workshops were conducted in alignment with the published RFI and sought to solicit viewpoints from across the nation. The first workshop was held on April 25, 2012, at Rensselaer Polytechnic Institute in Troy, New York, the second on July 9, 2012 at Cuyahoga Community College in Cleveland, Ohio, the third on September 27, 2012 at the Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering in Irvine, California, and the fourth on October 18, 2012 at the Millennium Harvest House in Boulder, Colorado.

Workshop Reports (visit http://www.manufacturing.gov/rfi_responses.html to view each workshop report)

- *Designing for Impact I* – Troy, NY
- *Designing for Impact II* - Cleveland, Ohio
- *Designing for Impact III* - Irvine, California
- *Designing for Impact IV* - Boulder, Colorado

RFI Responses (visit http://www.manufacturing.gov/rfi_responses.html to view all responses)

- | | |
|--|--|
| • Agenda 2020 Technology Alliance of the Forest Products Industry; Brown | • Berkowitz |
| • Arizona State University; Dineen | • Buthe |
| • Association of Public and Land-grant Universities; Woodell | • Clarkson University; Çetinkaya |
| • BAE Systems Land & Armaments; Toone | • Colorado Advanced Manufacturing Alliance; Heaton |

NNMI Workshop: *Blueprint for Action* • U.S. Space and Rocket Center, Davidson Center for Space Exploration
Huntsville, Alabama • January 16, 2013

Welcome to the *Blueprint for Action* Workshop!

Dear Participant:

The Advance Manufacturing National Program Office (NPO), in partnership with our hosts, the Department of Defense, NASA, and the University of Alabama in Huntsville, are pleased to welcome you to this first, *Blueprint for Action* workshop in Huntsville!

Today's workshop will provide a forum for the Advance Manufacturing NPO to present and discuss with you and other stakeholders the preliminary design of the President's proposed NNMI and its regional components, Institutes for Manufacturing Innovation (IMIs). In addition, the workshop will review public comments received by the Advanced Manufacturing NPO in response to the May 4, 2012 NNMI Request for Information, will update participants on the NNMI initiative; and will help participants prepare for anticipated next steps.

I also would like you to consider providing the NPO any statement or view on the NNMI you would like to offer for inclusion within the workshop's final report. If so, please include your comment in the workshop *Feedback Form* and preferred citation information (name, title, organization or affiliation).



Mike Molnar
Director, Advanced Manufacturing National Program Office
Chief Manufacturing Officer
National Institute of Standards and Technology (NIST)
U.S. Department of Commerce

Workshop Format and Process

Plenary Presentations:

Participants will hear welcoming remarks from the workshop host, followed by plenary presentations. Invited speakers from the Department of Defense, the National Institute of Standards and Technology (NIST), and the Advanced Manufacturing National Program Office will offer federal perspectives on the proposed NNMI and related activities. A subsequent plenary panel discussion featuring regional advanced manufacturing leaders will offer perspectives in building technology clusters and private-public partnerships.

Facilitated Breakout Sessions:

- Café room assignments are indicated on the attendee list in your event package.
- Each workshop registrant will participate in two Café periods covering all four design elements: *Technologies with Broad Impact; Institute Structure and Governance; Strategies for Sustainable Institute Operations; and Education and Workforce Development.*
- A team composed of two federal agency representatives, professional facilitator, and scribes will support the Café discussions.
- Participants will engage in active discussion, and will have the opportunity to provide individual inputs. Participants will receive materials at the beginning of each Café period for your reference and use. This includes a brief description of the Café and discussion topics and color-coded worksheets.
- Participants are asked to provide written input on the discussion topics by completing the worksheet for that topic during the Café.
- Café worksheets should be turned in to facilitators prior to leaving the Café session.

CAFÉ DISCUSSION 1: *TECHNOLOGIES WITH BROAD IMPACT*

THE CHALLENGE:

For its particular technology focus area, each Institute should be designed to address issues related to the “industrial commons,” or the collective research and development (R&D), engineering, and manufacturing capabilities that sustain innovation. This includes addressing shared problems throughout the supply and/or value chain and across multiple end-use applications. The stage of the selected technology areas is envisioned to be within TRL 4-7, whereby process economics are further clarified and scale-up issues are better defined and quantified. Further, the Institutes should have strategies for transitioning and implementing to larger-scale production beyond Institute operations.

The topics below are intended to assist in the formulation of individual participant input and should not be construed as a limitation on the discussion or as a limitation on the topics participants may wish to address in their written or verbal inputs. Participants are encouraged to identify best practices, and provide recommended strategies and approaches, when appropriate, as a part of their input.

Topics: Based upon the concepts presented within the published NNMI design report, how would you address the following topics?

1. How could a proposing team select a well-defined focus area that meets both industry and national needs? What metrics could be used to help justify the selected focus area(s) and scale of effort?
2. How would you design an Institute with a regional focus and position the Institute to create national/international technical preeminence? Is it possible to do this with an industry, technology, or process and product focused Institute agenda?

Other Topics or Input

CAFÉ DISCUSSION 2: *INSTITUTE STRUCTURE AND GOVERNANCE*

THE CHALLENGE:

Each Institute is envisioned to be a public-private partnership composed of many different types of organizations. Also, each Institute is envisioned to have a clearly defined mission, goal, and structure. Consequently, it is important for each Institute to function under a coherent framework with well-managed operating procedures that allow for flexibility. It will be important for the Institutes to demonstrate the capability to manage the complexity and diversity of the participating entities for successful Institute performance.

The topics below are intended to assist in the formulation of individual participant input and should not be construed as a limitation on the discussion or as a limitation on the topics participants may wish to address in their written or verbal inputs. Participants are encouraged to identify best practices, and provide recommended strategies and approaches, when appropriate, as a part of their input.

Topics: Based upon the concepts presented within the published NNMI design report, how would you address the following topics?

1. The NNMI preliminary design calls for an Institute to be led by an independent, not-for-profit organization. How then should an Institute leverage academic and regional resources, interface effectively with these and other key stakeholders, and manage intellectual property obligations?
2. How should participation by non-domestic organizations be managed to maximize impact to the United States? For example, how might an Institute manage participation by a multi-national organization? Should a non-domestic organization participate in or lead a project?

Other Topics or Input

CAFÉ DISCUSSION 3: *STRATEGIES FOR SUSTAINABLE INSTITUTE OPERATIONS*

THE CHALLENGE:

Each Institute would be catalyzed through an initial investment from the Federal Government. Each Institute should have a plan and strategy for private sector co-investment and should maintain robust performance beyond the initial federal investment. Institute members will need to demonstrate the necessary financial and strategic commitment to ensure successful operation.

The topics below are intended to assist in the formulation of individual participant input and should not be construed as a limitation on the discussion or as a limitation on the topics participants may wish to address in their written or verbal inputs. Participants are encouraged to identify best practices, and provide recommended strategies and approaches, when appropriate, as a part of their input.

Topics: Based upon the concepts presented within the published NNMI design report, how would you address the following topics?

1. How can an Institute sustain its operations beyond the 5-7 year mark?
 - a) How can an Institute unlock private investment? What strategies could be followed to attract partners, with particular attention to infrastructure and shared-use facilities, training and education, and other Institute “products”?
 - b) What might a sustainable Institute budget look like? How would an Institute’s diverse funding sources evolve with time?
- 2) What might be some go/no-go criteria for uninterrupted flow of NNMI funds to an Institute?

Other Topics or Input

NNMI Workshop: *Blueprint for Action* • U.S. Space and Rocket Center, Davidson Center for Space Exploration
Huntsville, Alabama • January 16, 2013

CAFÉ DISCUSSION 4: *EDUCATION AND WORKFORCE DEVELOPMENT*

THE CHALLENGE:

The availability of qualified workers is essential to the scale-up of new manufacturing technologies. Manufacturing competitiveness in an era of rapid technological and market change requires workers to have advanced skills and the foundational knowledge to quickly obtain new skills. Developing and enhancing the skill set of current, displaced, and new employees will be critical for Institute success.

The topics below are intended to assist in the formulation of individual participant input and should not be construed as a limitation on the discussion or as a limitation on the topics participants may wish to address in their written or verbal inputs. Participants are encouraged to identify best practices, and provide recommended strategies and approaches, when appropriate, as a part of their input.

Topics: Based upon the concepts presented within the published NNMI design report, how would you address the following topics?

1. How can an Institute exercise industry leadership with other key stakeholders in workforce training and development?
2. How should an Institute be responsive to a region's workforce development and training priorities, and pursue initiatives that are responsive to the nation's needs?

Other Topics or Input

FEEDBACK FORM • NNMI WORKSHOP: *BLUEPRINT FOR ACTION*

Sector: <i>(circle one)</i>	Academia	Industry	Organization: ...	
Venture/Capital	Economic Dev.	Res. non-profit	State:	
Federal Govt.	State Govt.	Other	Name: <i>(optional)</i>	

SIDE 1 – *BLUEPRINT FOR ACTION* WORKSHOP FEEDBACK

1. Please provide specific feedback: Do you agree? What went well? What should be improved?	
1.1. The workshop purpose was clearly stated.	
1.2. The workshop objectives were met.	
1.3. The advance information was helpful.	
1.4. The agenda was appropriate.	
1.5. The plenary keynotes and NNMI design presentations helped answer my key questions.	
1.6. The Café discussion topics were valuable and useful for my future efforts.	
1.7. The perspectives panel on building clusters was useful and well structured.	
2. Please provide feedback on the structure and conduct of each of the Café periods you participated in:	
2.1. Technologies with Broad Impact	
2.2. Institute Structure and Governance	
2.3. Strategies for Sustainable Institute Operations	
2.4. Education and Workforce Development	
3. Please provide overall feedback:	
3.1. What went well in this workshop?	
3.2. What suggestions do you have to improve future NNMI workshops?	

Please turn the page and answer the questions on the other side